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Al Hennawi

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(54) **APPLYING CORROSION INHIBITOR WITHIN TUBULARS**

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(51) **Int. Cl.**

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B05C 1/06	(2006.01)
B05C 7/08	(2006.01)
B05C 7/02	(2006.01)
B05D 3/12	(2006.01)
B05D 7/22	(2006.01)
C23F 11/00	(2006.01)

(Continued)

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CPC ***B05D 3/12*** (2013.01); ***B05B 1/20*** (2013.01); ***B05B 13/0627*** (2013.01); ***B05C 1/06*** (2013.01); ***B05C 7/02*** (2013.01); ***B05C 7/08*** (2013.01); ***B05D 1/02*** (2013.01); ***B05D 7/225*** (2013.01); ***C23F 11/00*** (2013.01); *B05D 7/222* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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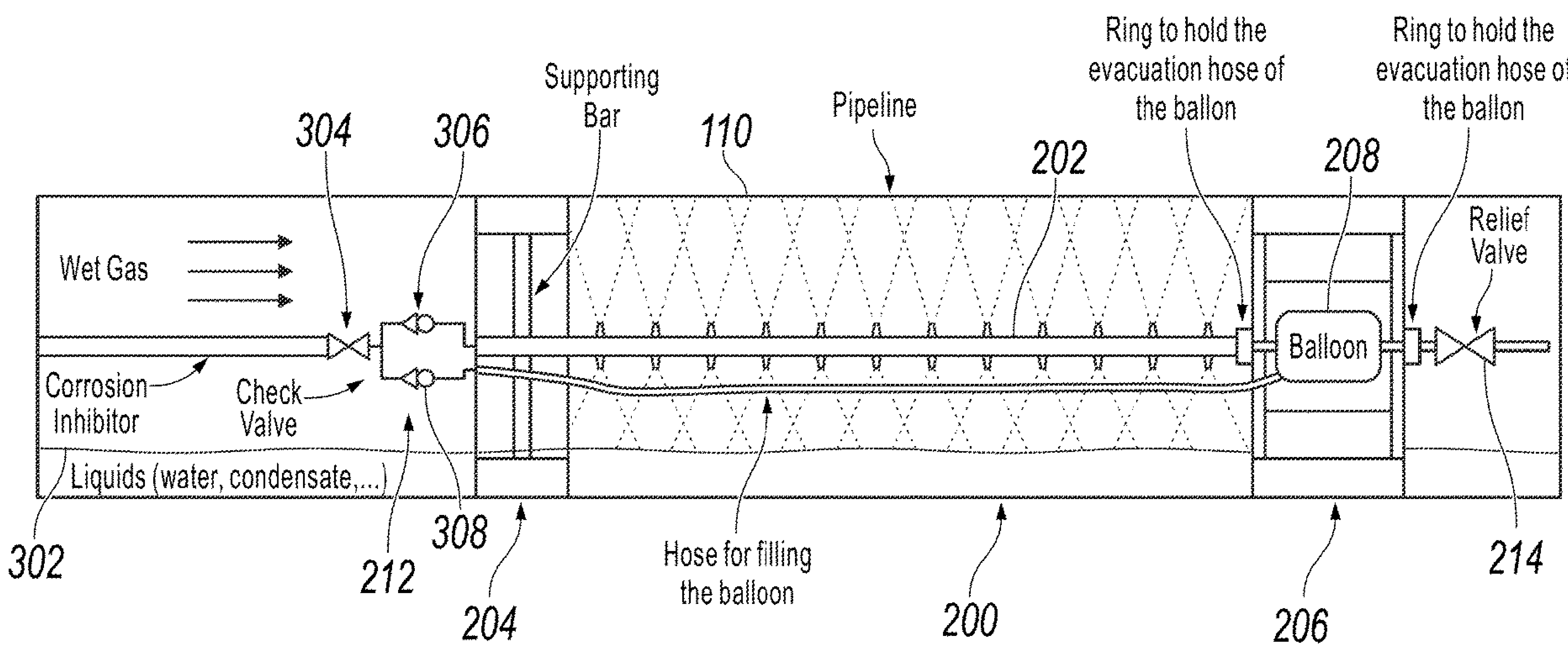
(57) **ABSTRACT**

A central tubular defines a central flow passage and spray nozzles along an outer circumference of the central tubular. A first brush pig supports a first end of the central tubular. A second brush pig supports a second end of the tubular. An inflatable balloon is at the second end of the tubular. The inflatable balloon is encircled by the second brush pig. The inflatable balloon is configured to cause a first pressure drop across the balloon when in an inflated state and cause a second pressure drop, less than the first pressure drop, across the balloon when in a deflated state. A flow control system is at the first end of the tubular and is configured to regulate fluid exchange with the tubular and fluid exchange with the inflatable balloon.

14 Claims, 7 Drawing Sheets



(51) **Int. Cl.**

B05B 1/20	(2006.01)
B05D 1/02	(2006.01)

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WO	WO 2011135360	11/2011
WO	WO 2018057361	3/2018
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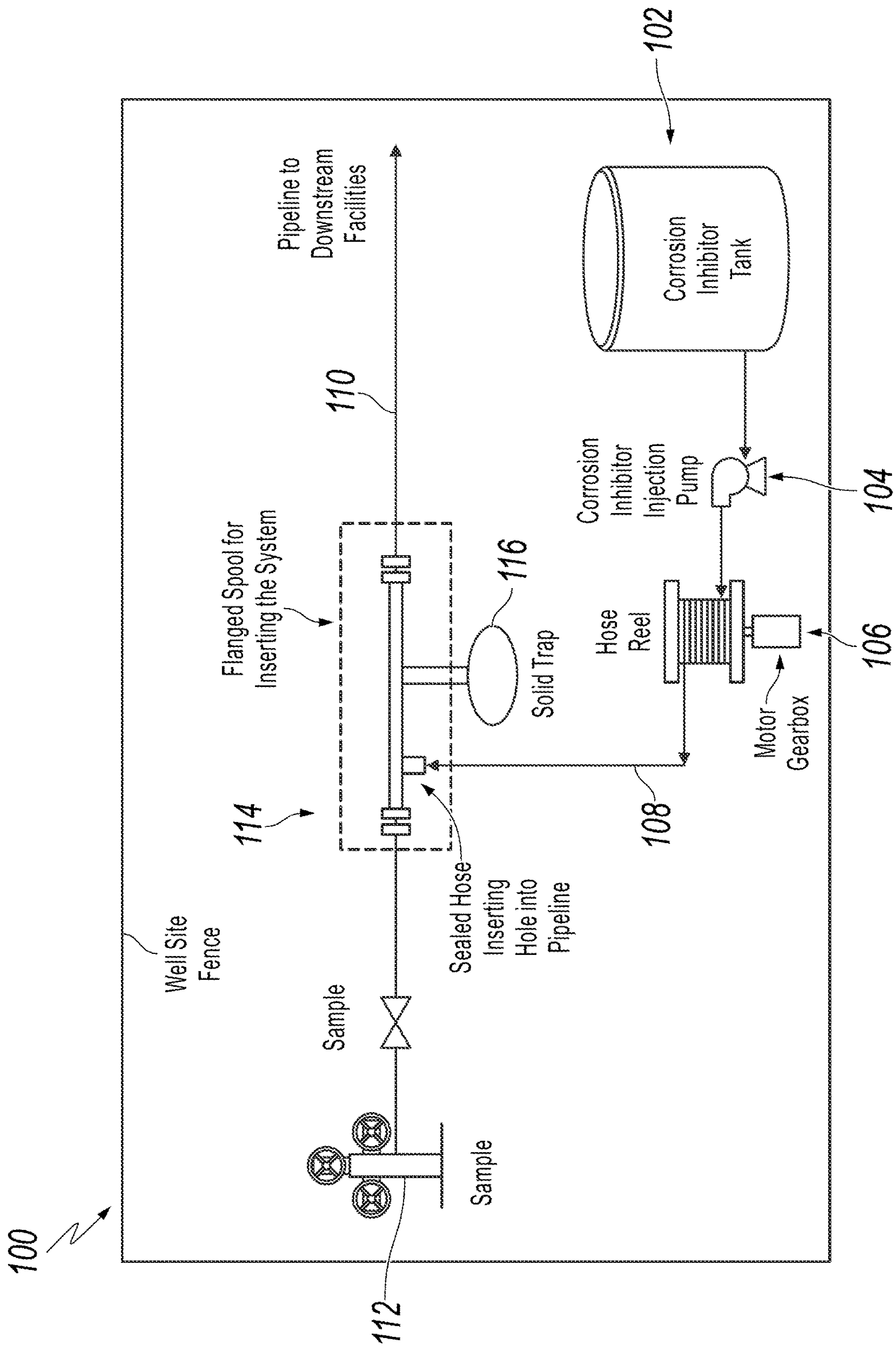
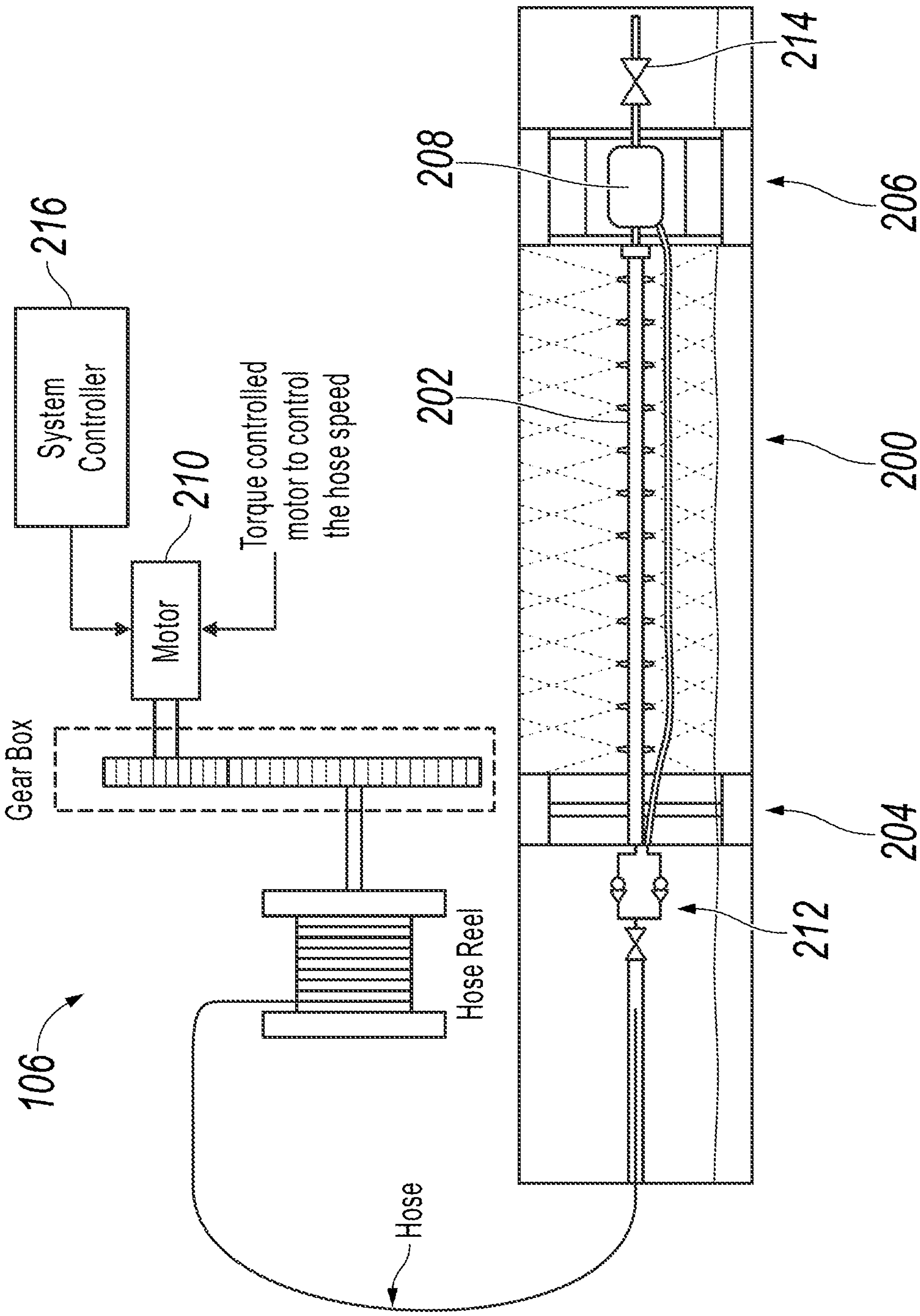

102
Corrosion Inhibitor Tank
Pipeline to Downstream Facilities
110
Corrosion Inhibitor Injection Pump
104
Flanged Spool for Inserting the System
116
Solid Trap
Hose Reel
106
Motor Gearbox
114
108
Sealed Hose Inserting Hole into Pipeline
Well Site Fence
Sample
Sample
100
112

FIG. 1



216
System Controller
210
Motor
Torque controlled motor to control the hose speed
Gear Box
Hose Reel
Hose
106
214
208
206
202
200
204
212

FIG. 2

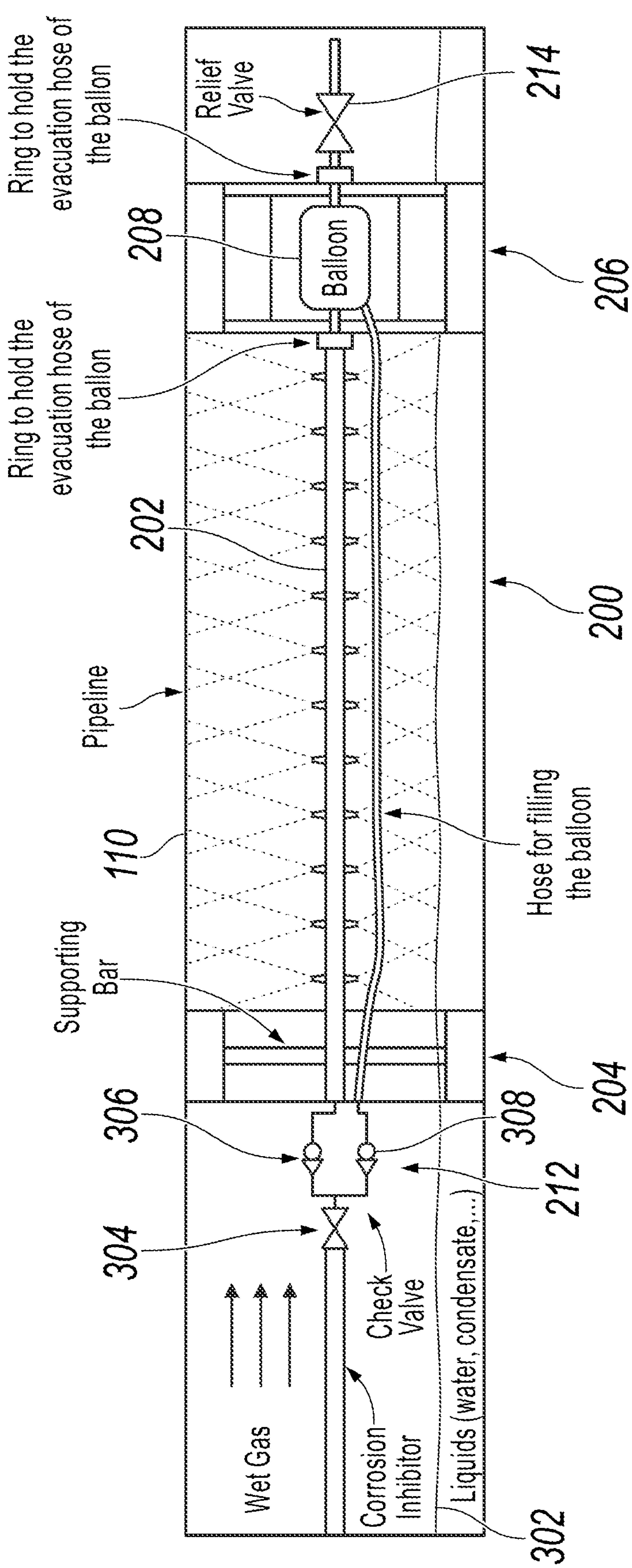

Ring to hold the evacuation hose of the ballon
Relief Valve
214
208
Balloon
206
Ring to hold the evacuation hose of the ballon
202
200
Pipeline
110
Hose for filling the balloon
Supporting Bar
204
306
308
212
304
Check Valve
Wet Gas
Corrosion Inhibitor
Liquids (water, condensate,...)
302

FIG. 3

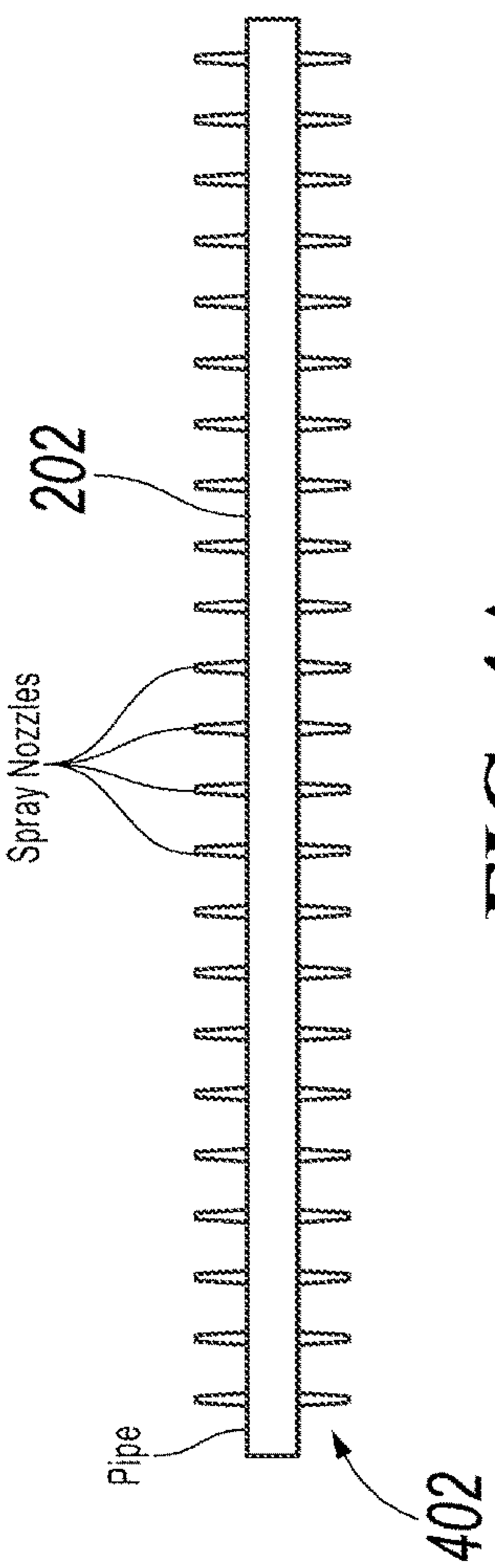


FIG. 4A

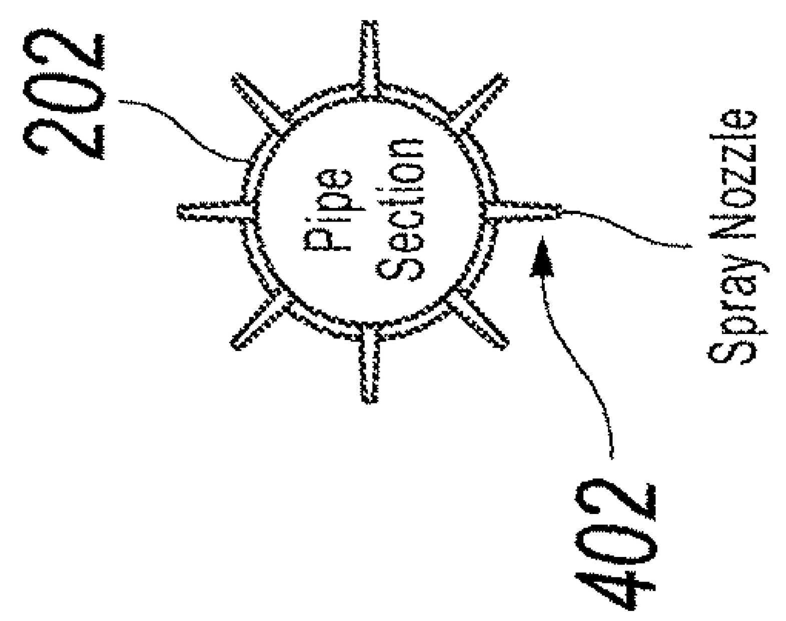


FIG. 4B

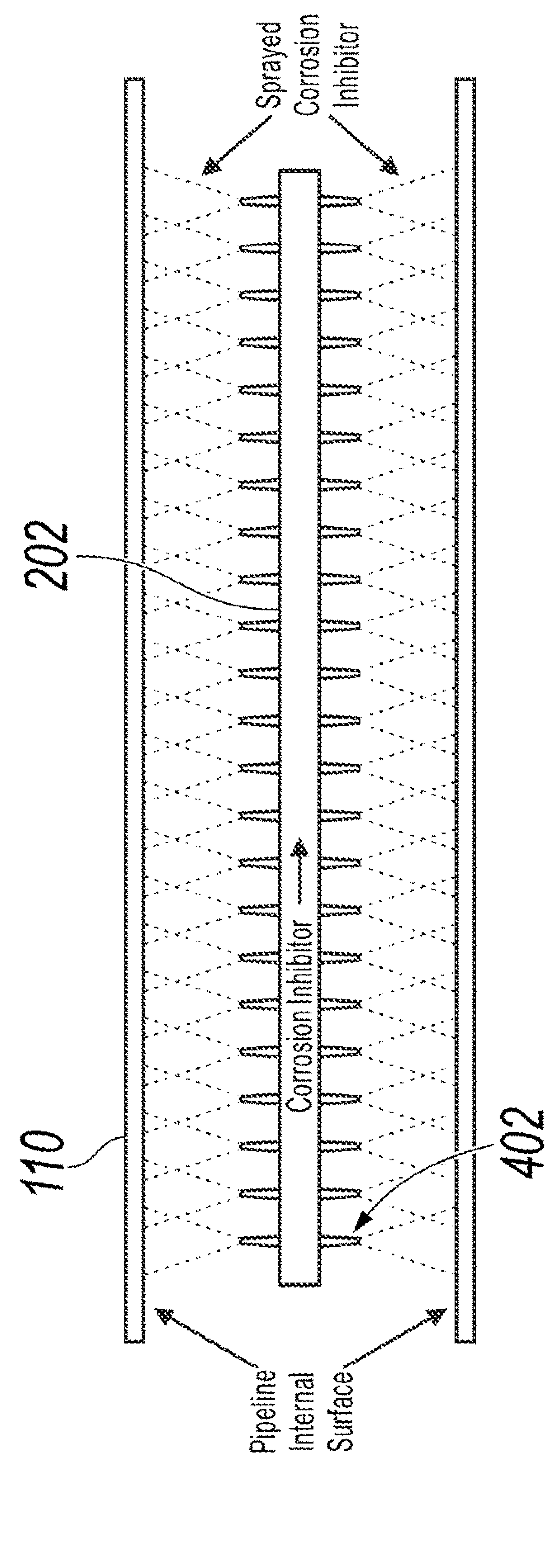


FIG. 4C

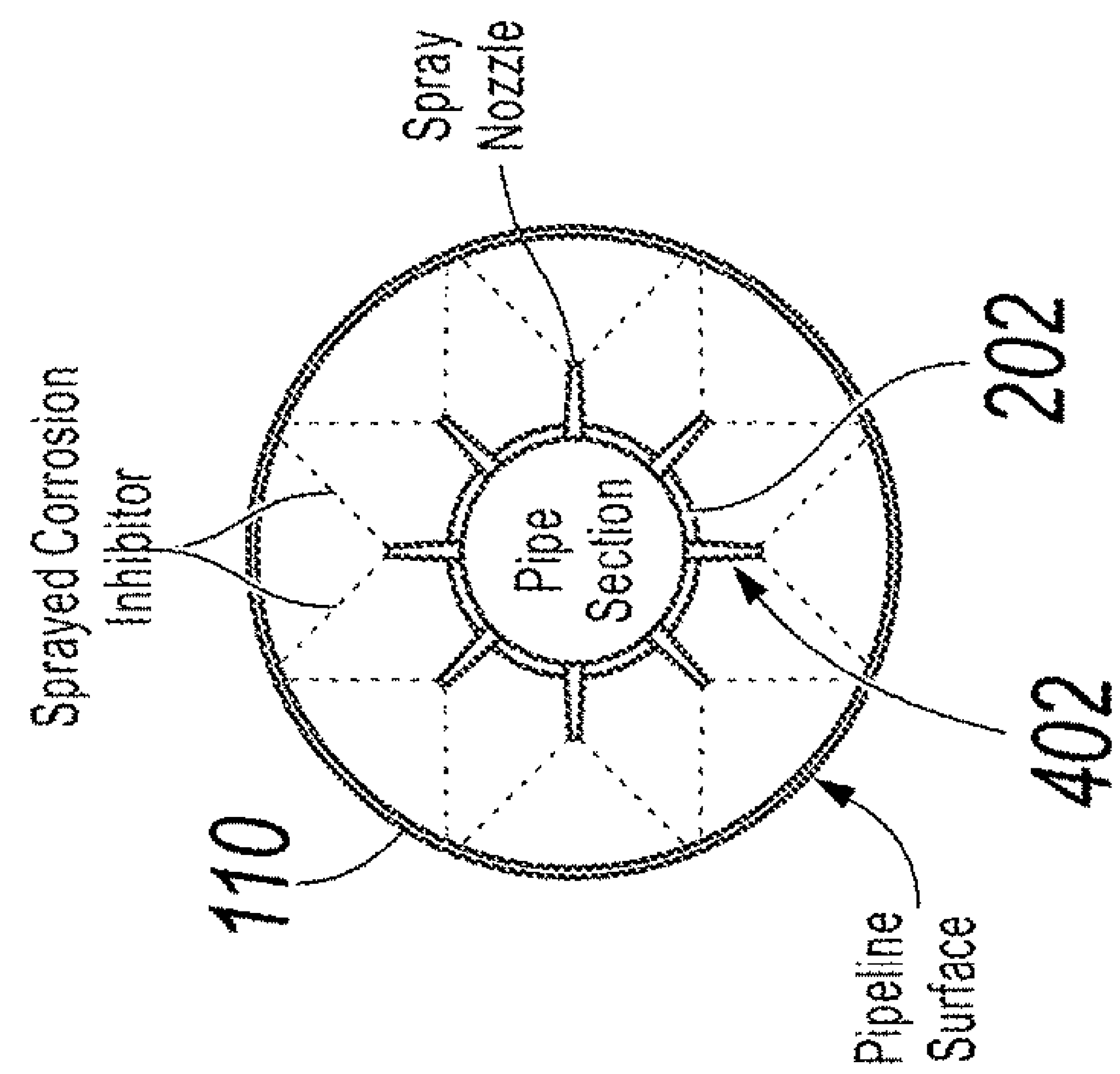


FIG. 4D

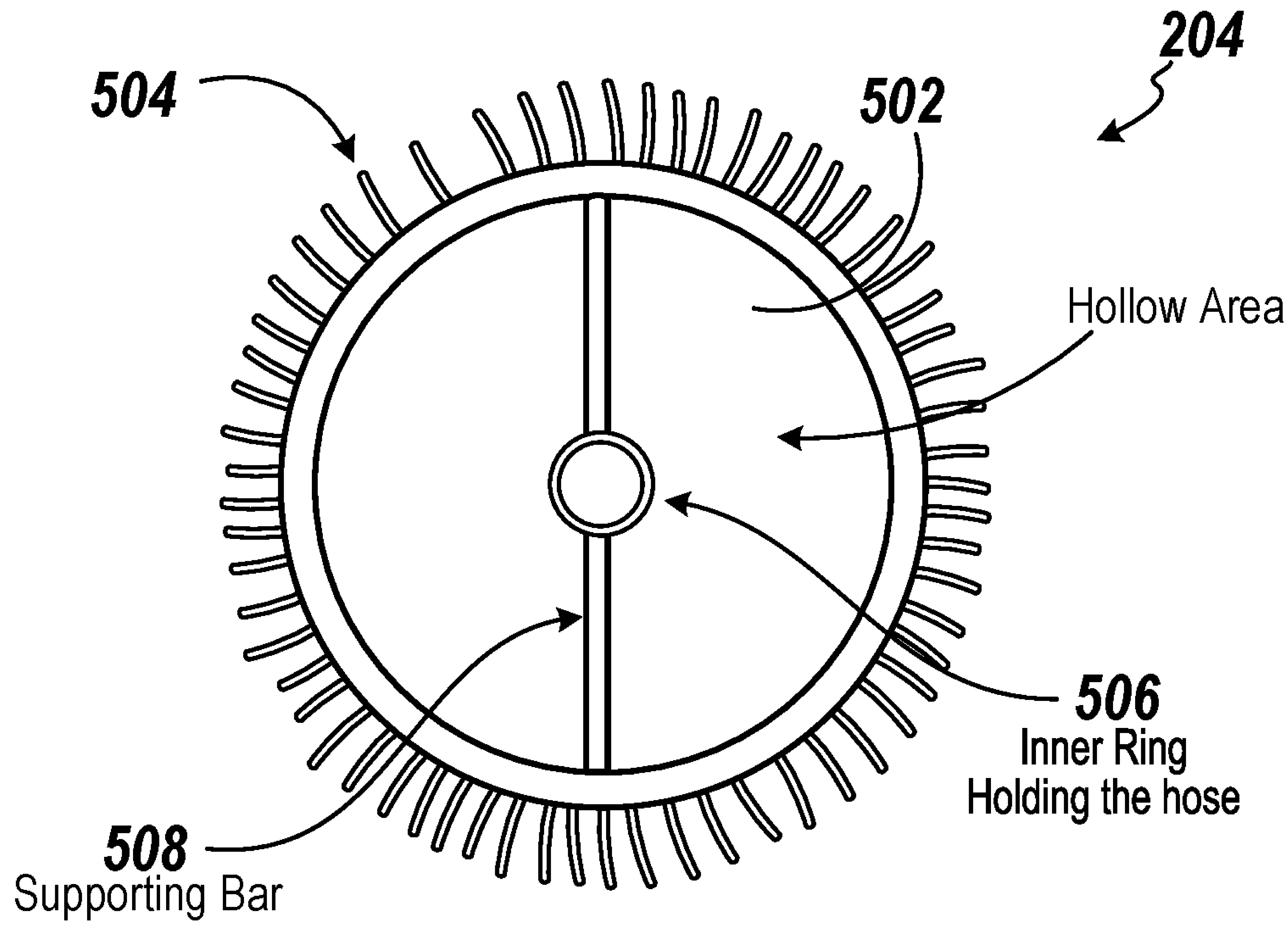

204
504
502
Hollow Area
506
Inner Ring
Holding the hose
508
Supporting Bar

FIG. 5A

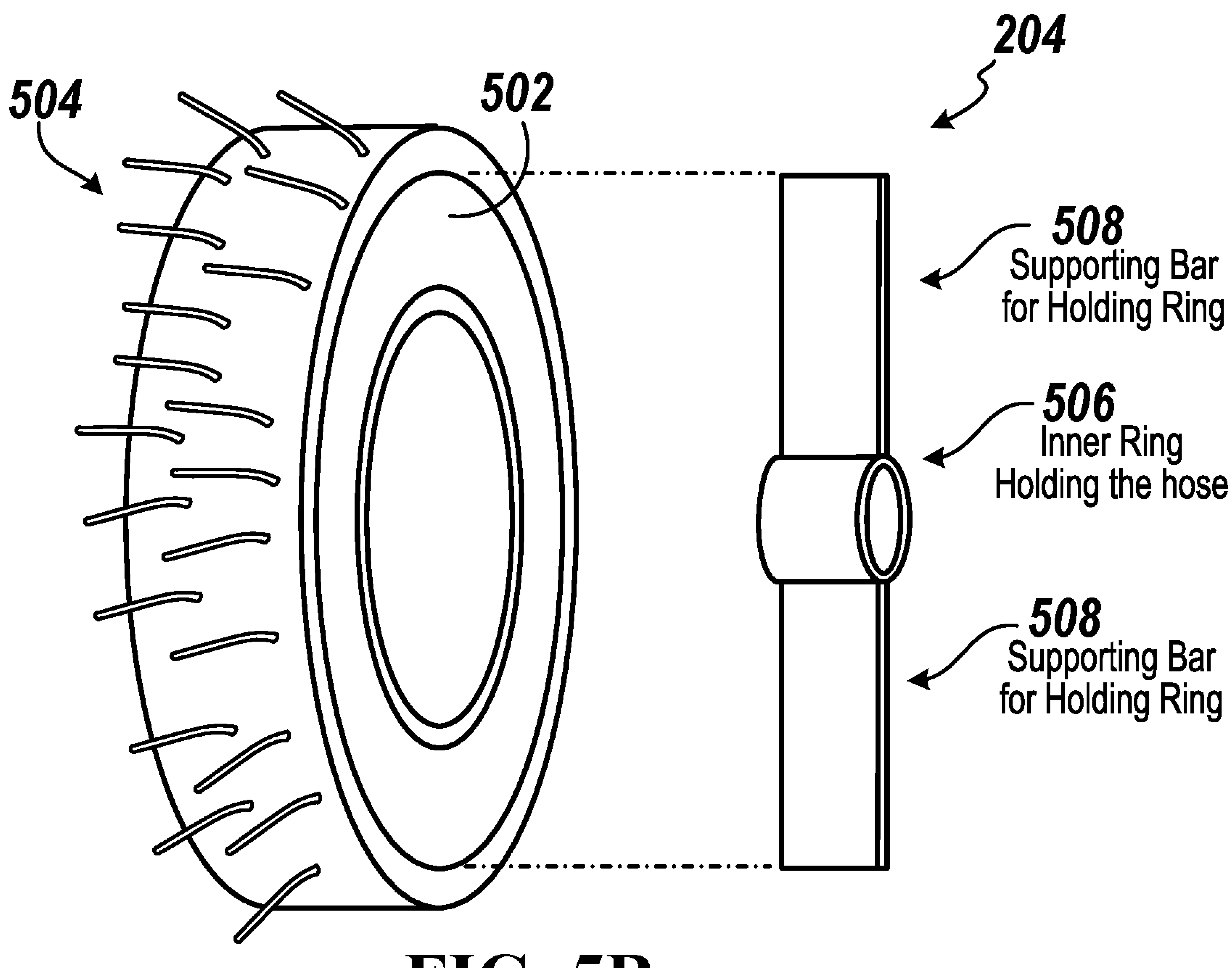

204
504
502
508
Supporting Bar
for Holding Ring
506
Inner Ring
Holding the hose
508
Supporting Bar
for Holding Ring

FIG. 5B

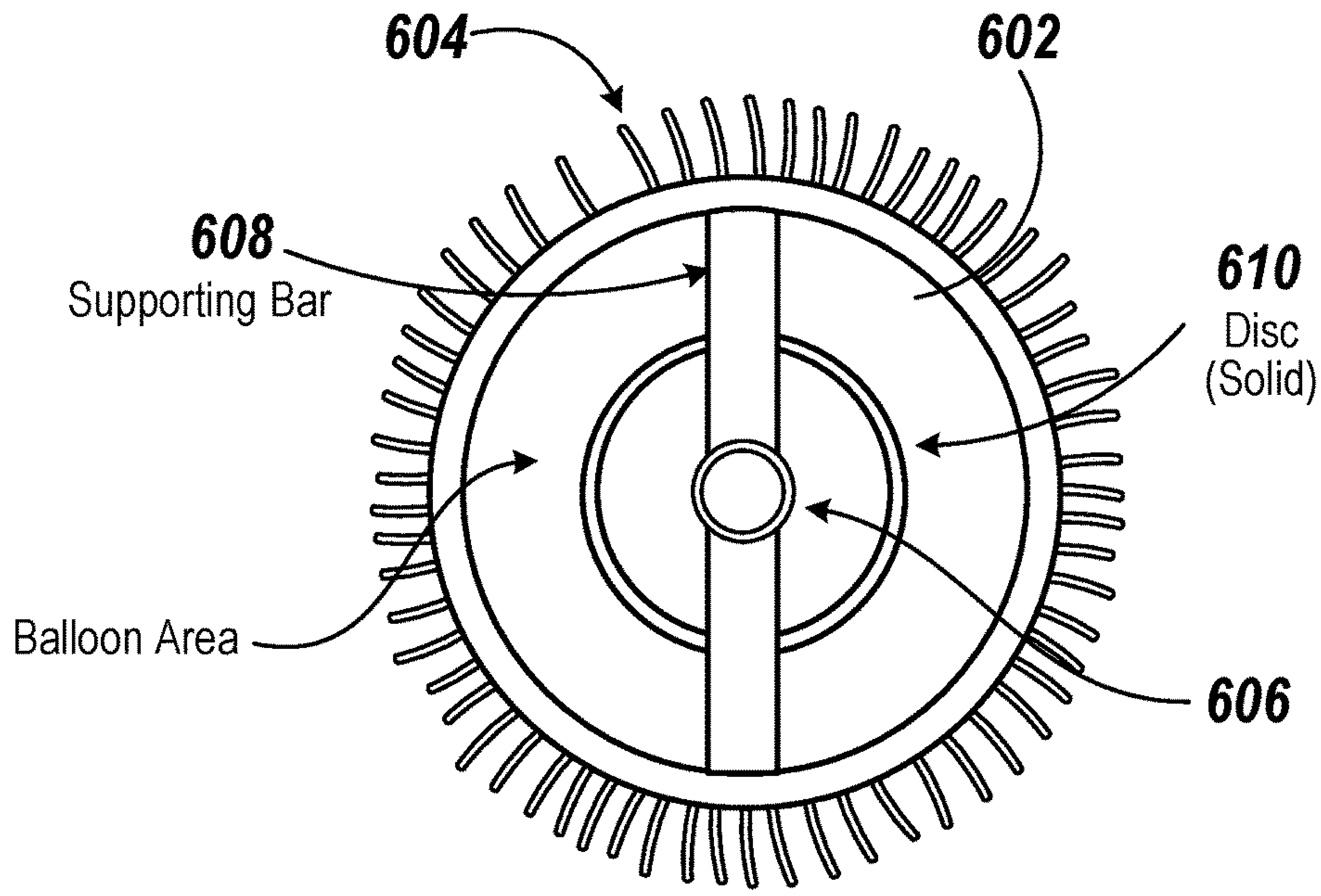

604
602
608
Supporting Bar
610
Disc
(Solid)
Balloon Area
606

FIG. 6A

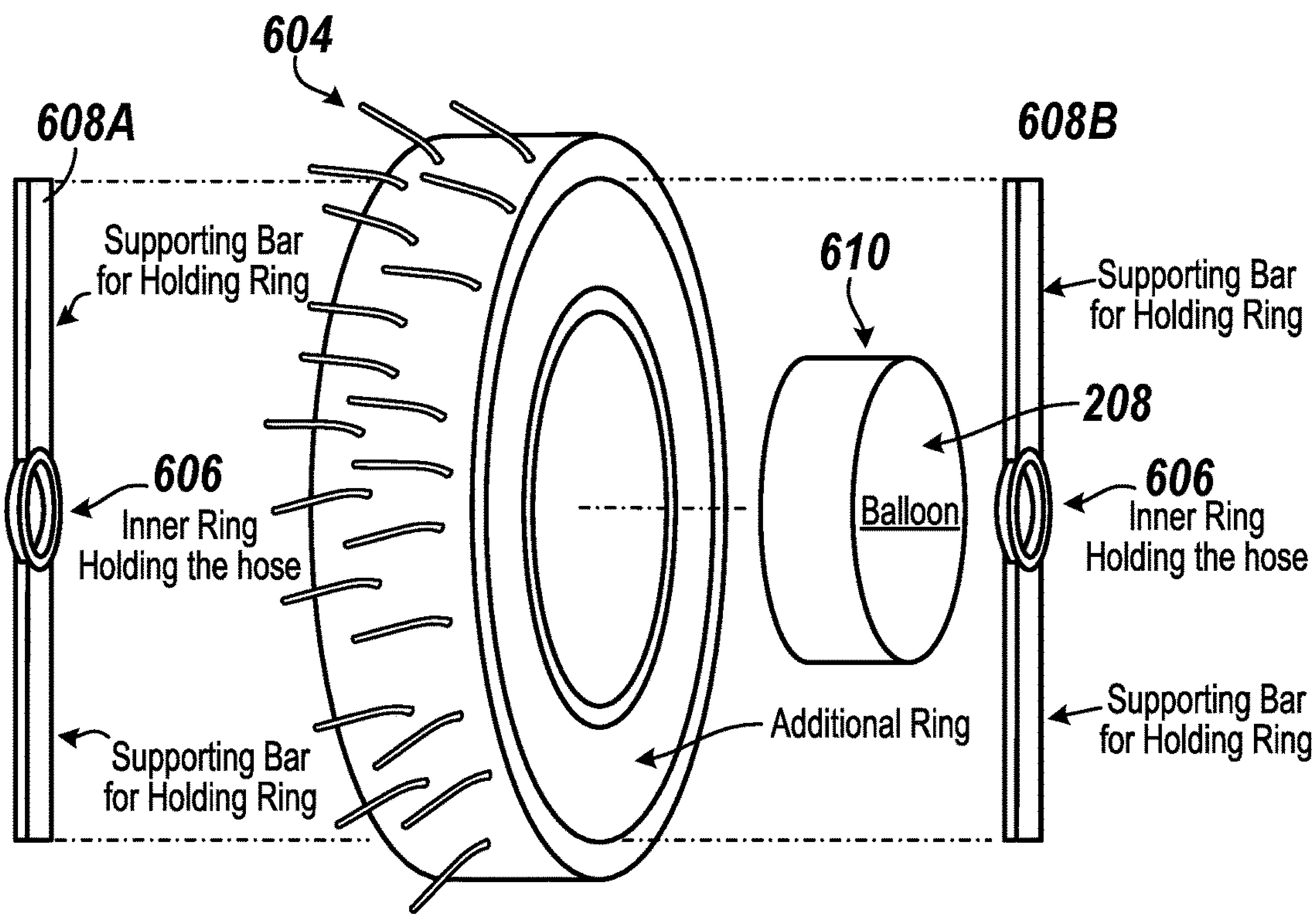

604
608A
608B
Supporting Bar
for Holding Ring
610
Supporting Bar
for Holding Ring
208
606
Inner Ring
Holding the hose
Balloon
606
Inner Ring
Holding the hose
Additional Ring
Supporting Bar
for Holding Ring
Supporting Bar
for Holding Ring

FIG. 6B

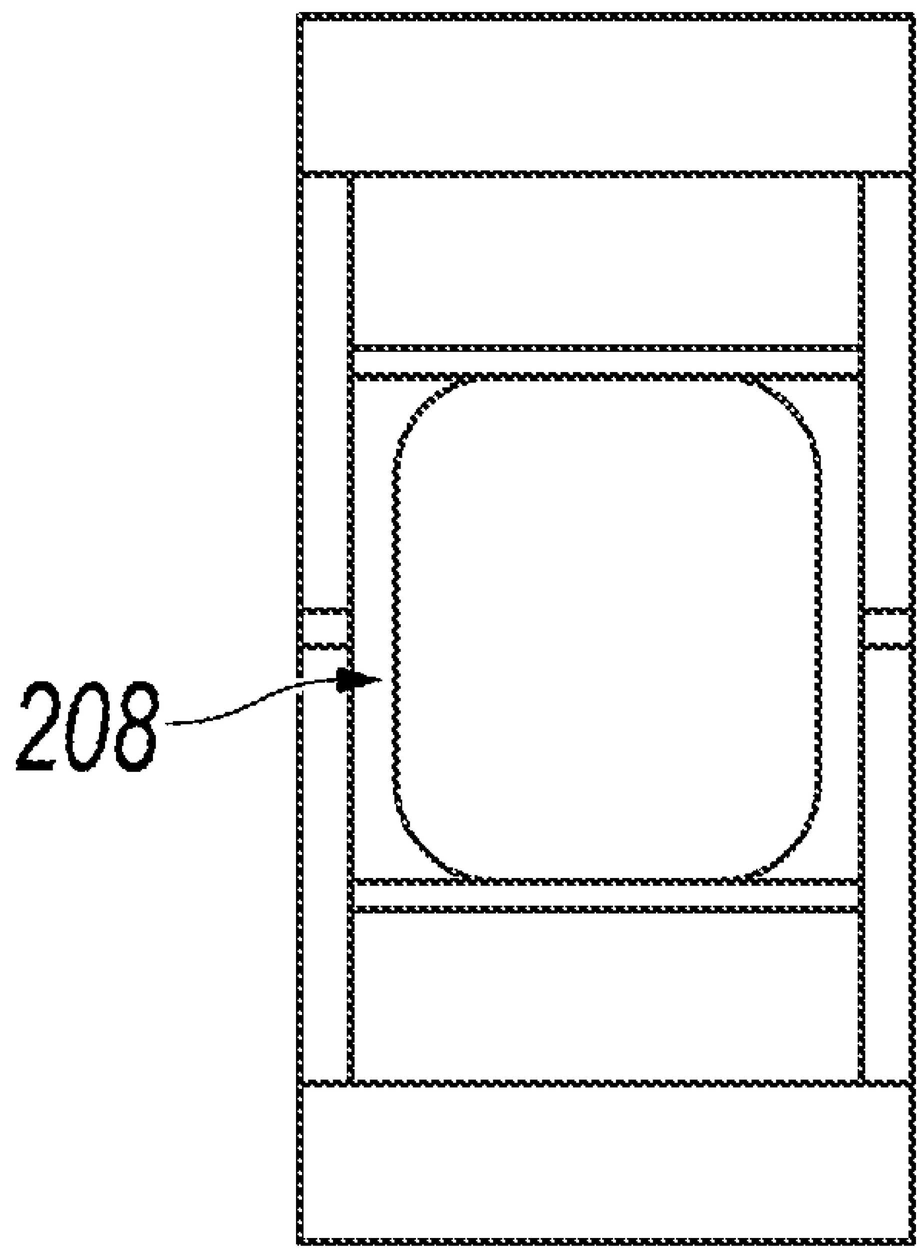


FIG. 6C

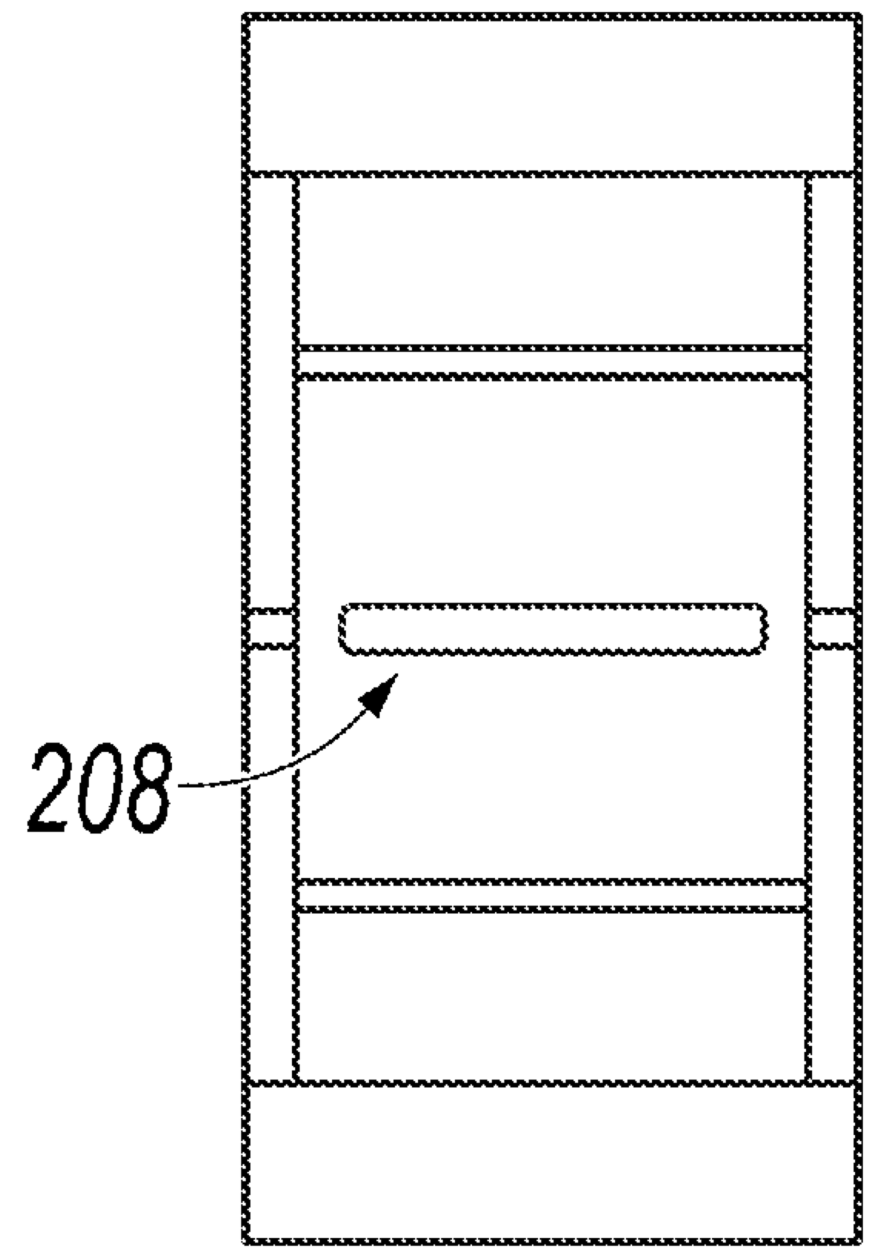


FIG. 6D

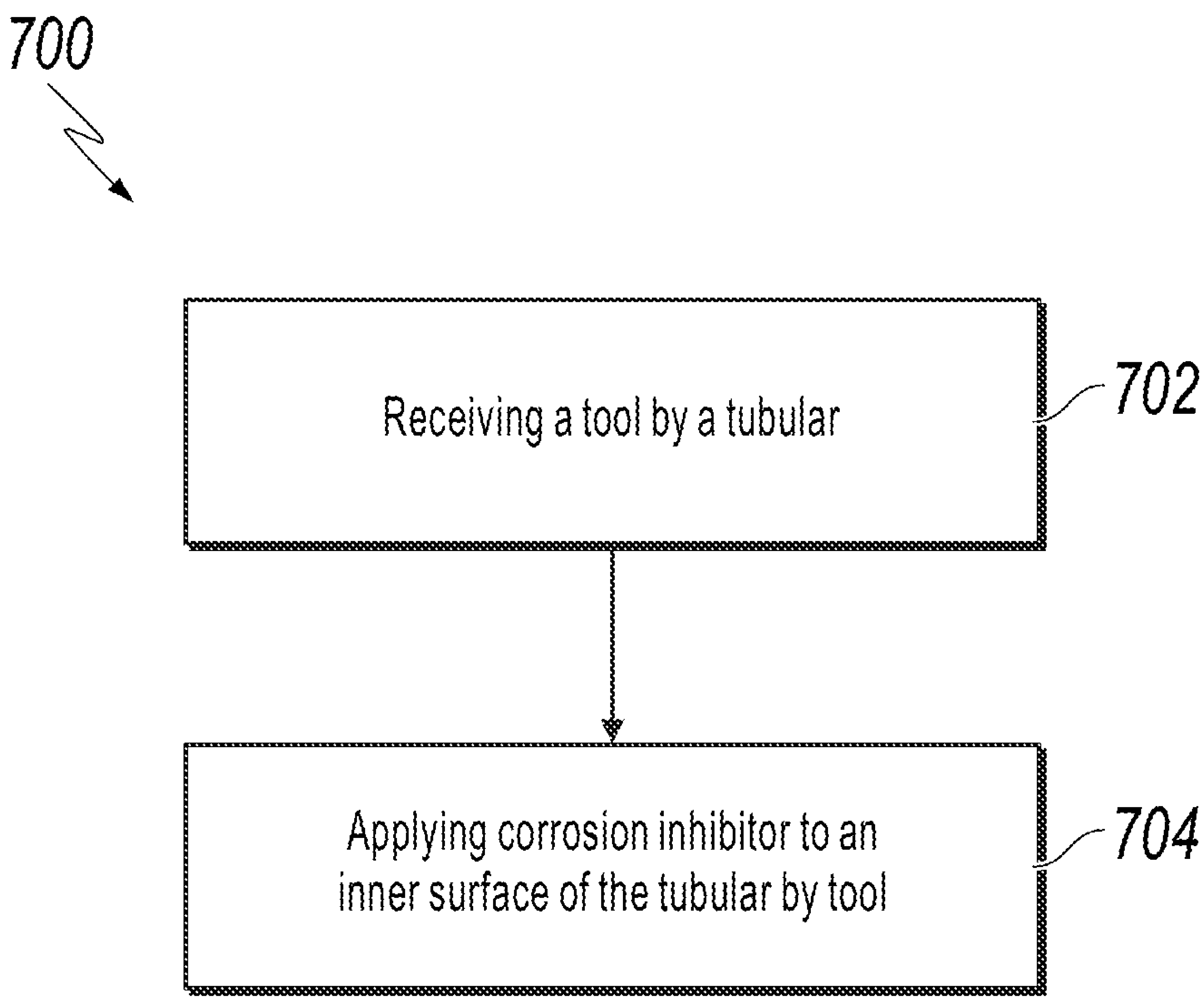


FIG. 7

APPLYING CORROSION INHIBITOR WITHIN TUBULARS

TECHNICAL FIELD

This disclosure relates to applying corrosion inhibitors within tubulars, such as wellbores or flowlines.

BACKGROUND

When producing hydrocarbons, the interior of piping is often exposed to corrosive agents, such as carboxylic acid or hydrogen sulfide. The two ways to counteract these agents within the piping is to construct the piping out of a material compatible with the corrosive agents, or to inject corrosion inhibitor chemicals into the piping with the corrosive agents. Constructing the piping out of corrosion resistant materials incurs high capital cost. In addition, production fluid characteristics change over time. For example, a production facility may begin life processing non-corrosive fluids, only to be exposed to corrosion fluids later in life. Injecting corrosion inhibitor has a lower capital cost in comparison to constructing a facility with corrosion resistant materials, though the operation costs can be higher due to the continual injection of chemicals. Injecting corrosion inhibitor is also a flexible option. For example, corrosion inhibitor can be added or injected only in systems that are currently experiencing corrosive fluid production.

SUMMARY

This disclosure describes technologies relating to applying corrosion inhibitor within tubulars.

An example implementation of the subject matter described within this disclosure is a tool system with the following features. A central tubular defines a central flow passage and spray nozzles along an outer circumference of the central tubular that fluidically connect the flow passage to an outside environment. The tubular is configured to receive fluid from a corrosion inhibitor pump and direct the fluid along an inner circumference of a tubular in which the tool is inserted. A first brush pig supports a first end of the central tubular. The first brush pig is configured to support the first end of the central tubular. A second brush pig supports a second end of the tubular. The second brush pig is configured to support the second end of the central tubular. An inflatable balloon is at the second end of the tubular. The inflatable balloon is encircled by the second brush pig. The inflatable balloon is configured to cause a first pressure drop across the balloon when in an inflated state and cause a second pressure drop, less than the first pressure drop, across the balloon when in a deflated state. A flow control system is at the first end of the tubular. The flow control system is configured to regulate fluid exchange with the tubular and fluid exchange with the inflatable balloon. The flow control system is configured to receive a chemical injection line connected to a corrosion inhibitor pump.

Aspects of the example tool system, which can be combined with the example tool system alone or in combination with other aspects, include the following. The first brush pig includes an outer ring defining an inner surface and an outer surface. A brush emits from the outer surface of the ring. An inner ring is radially centered within the outer ring. The inner ring is configured to support the tubular. A support bar extends between an outer surface of the inner ring and an inner surface of the outer ring. The support bar supports the inner ring to the outer ring.

The second brush pig includes an outer ring defining an inner surface and an outer surface. A brush emits from the outer surface of the ring. An inner ring radially is radially centered within the outer ring. The inner ring is configured to support the tubular and the balloon. A first support bar extends between an outer surface of the inner ring and an inner surface of the outer ring. The support bar supports the inner ring to the outer ring. A second support bar extends between an outer surface of the inner ring and an inner surface of the outer ring. The support bar supports the inner ring to the outer ring. The first support bar and the second support bar axially retain the balloon. A solid disk is between the inner ring and the outer ring. The solid disk is supported by the outer ring. The solid disk surrounds the balloon.

Aspects of the example tool system, which can be combined with the example tool system alone or in combination with other aspects, include the following. The flow control system includes a directional valve configured to direct fluid flow to the tubular or the inflatable balloon. A first check valve is between the directional control valve and the tubular. The first check valve is configured to direct fluid flow towards the tubular. A second check valve is between the directional control valve and the inflatable balloon. The second check valve is configured to direct fluid flow towards the balloon.

Aspects of the example tool system, which can be combined with the example tool system alone or in combination with other aspects, include the following. The directional valve is an electronically controlled valve.

Aspects of the example tool system, which can be combined with the example tool system alone or in combination with other aspects, include the following. The electronically controlled valve is configured to be controlled by a controller at a corrosion inhibitor pump.

Aspects of the example tool system, which can be combined with the example tool system alone or in combination with other aspects, include the following. A relief valve is at a downhole end of the tool. The relief valve is configured to release pressure from the inflatable balloon.

An example implementation of the subject matter described within this disclosure includes a method with the following features. A tool is received by a tubular. The tool includes a central tubular defining a central flow passage and spray nozzles fluidically connecting the flow passage to an outside environment. A first brush pig supports a first end of the tubular. A second brush pig supports a second end of the tubular. An inflatable balloon is at the second end of the tubular. The inflatable balloon is encircled by the second brush pig. A flow control system is at the first end of the tubular. The flow control system is configured to regulate fluid exchange with the tubular and fluid exchange with the inflatable balloon. The flow control system is configured to receive a chemical injection line. Corrosion inhibitor is applied to an inner surface of the tubular by the tool.

Aspects of the example method, which can be combined with the example method alone or in combination with other aspects, include the following. The balloon is inflated by the corrosion inhibitor. A pressure differential is created across the tool responsive to inflating the balloon. The tool is moved in a downhole direction responsive to the pressure differential.

Aspects of the example method, which can be combined with the example method alone or in combination with other aspects, include the following. Applying corrosion inhibitor to an inner surface of the tubular includes spraying corrosion inhibitor, by the central tubular, onto an inner surface of the

tubular. The corrosion inhibitor is spread by a brush along an outer surface of the first brush pig or the second brush pig.

Aspects of the example method, which can be combined with the example method alone or in combination with other aspects, include the following. The balloon is deflated by a relief valve fluidically coupled to the balloon. The tool is moved in an uphole direction by tension in a chemical supply line configured to supply corrosion inhibitor to the tool from a corrosion inhibitor pump.

Aspects of the example method, which can be combined with the example method alone or in combination with other aspects, include the following. The tubular includes a wellbore.

An example implementation of the subject matter described within this disclosure is an example system with the following features. A hose is coupled to a hose reel. A chemical injection pump is arranged to supply corrosion inhibitor through the hose. A tool includes a central tubular defining a central flow passage and spray nozzles fluidically connecting the flow passage to an outside environment. A first brush pig supports a first end of the tubular. A second brush pig supporting a second end of the tubular. An inflatable balloon is at the second end of the tubular. The inflatable balloon is encircled by the second brush pig. A flow control system is at the first end of the tubular. The flow control system is configured to regulate fluid exchange with the tubular and fluid exchange with the inflatable balloon. The flow control system is configured to receive a chemical injection line.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. The first brush pig includes an outer ring defining an inner surface and an outer surface. A brush emits from the outer surface of the ring. An inner ring is radially centered within the outer ring. The inner ring is configured to support the tubular. A support bar extends between an outer surface of the inner ring and an inner surface of the outer ring. The support bar supports the inner ring to the outer ring.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. The second brush pig includes an outer ring defining an inner surface and an outer surface. A brush emits from the outer surface of the ring. An inner ring is radially centered within the outer ring. The inner ring is configured to support the balloon. A support bar extends between an outer surface of the inner ring and an inner surface of the outer ring. The support bar supports the inner ring to the outer ring. A solid disk is between the inner ring and the outer ring. The solid disk is supported by the outer ring.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. The flow control system includes a directional valve configured to direct fluid flow to the tubular or the inflatable balloon. A first check valve is between the directional control valve and the tubular. The first check valve is configured to direct fluid flow towards the tubular. A second check valve is between the directional control valve and the inflatable balloon. The second check valve is configured to direct fluid flow towards the balloon.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. The directional valve is an electronically controlled valve.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. The electronically controlled valve is configured to be controlled by a controller at a corrosion inhibitor pump.

Aspects of the example system, which can be combined with the example system alone or in combination with other aspects, include the following. A relief valve is at a downhole end of the tool. The relief valve is configured to release pressure from the inflatable balloon.

Particular implementations of the subject matter described in this disclosure can be implemented so as to realize one or more of the following advantages. The subject matter described herein allows for an even distribution of fresh corrosion inhibitor across an entire interior surface of a tubular. The subject matter described herein reduces the amount of corrosion inhibitor needed to be effective compared to traditional methods. Alternatively or in addition, the subject matter described herein allows for control of travel rate, spray rate, and travel direction of an in-pipe tool. The subject matter described herein allows for simultaneous cleaning of an interior surface of a tubular while coating with corrosion inhibitor

The details of one or more implementations of the subject matter described in this disclosure are set forth in the accompanying drawings and the description below. Other features, aspects, and advantages of the subject matter will become apparent from the description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of a topside portion of an example corrosion inhibitor system.

FIG. **2** is a cross-sectional diagram of the example corrosion inhibitor system moving tool within a tubular.

FIG. **3** is a cross-sectional diagram of the example corrosion inhibitor system moving tool within a tubular.

FIGS. **4**A-**4**D are various views of the central tubular of the tool.

FIGS. **5**A and **5**B are various views of a brush pig at an uphole end of the tool.

FIGS. **6**A-**6**D are various views of a brush pig at a downhole end of the tool.

FIG. **7** is a flowchart of an example method that can be used with aspects of this disclosure.

Like reference numbers and designations in the various drawings indicate like elements.

DETAILED DESCRIPTION

Based on current injection techniques which take place at well sites, the injected corrosion inhibitor doesn't cover the entire internal tubular surface. This happens because liquid nonvolatile corrosion inhibitors settle at the bottom portion of the tubular due to gravity leaving the gas exposed or upper pipeline surface without contact with the injected corrosion inhibitor and in a direct contact with the flow corrosive agents, such as Hydrogen Sulfide (H_2S), Carbon Dioxide (CO_2), and Acetic Acid (HAc) in the presence of condensed water droplets due to the flow temperature drop along the pipeline.

This disclosure relates to a system and method for applying and evenly spreading corrosion inhibitor along an inner surface of a tubular, such as a well casing or pipe. The system includes a tool with a central tubular configured to receive fresh corrosion inhibitor from a corrosion inhibitor pump. The central tubular defines a central flow passage and nozzles that allow fluids, such as corrosion inhibitor fluids, to spray evenly in all directions. The central tubular is supported at each end by brush pigs. As the tool is moved through a tubular, the brush pigs evenly coat the internal surface of the tubular.

FIG. **1** is schematic diagram of a topside portion of an example corrosion inhibitor system **100**. The corrosion inhibitor system **100** includes a corrosion inhibitor tank **102** coupled to a corrosion inhibitor injection pump **104**. The corrosion inhibitor injection pump **104** is coupled to a hose reel **106** and hose **108**. The hose **108** is coupled to a tool (described later) that can be inserted into a tubular **110**. In the illustrated implementation, the tubular **110** is a flowline coupled to a wellhead **112**. While the implementations and examples described within this disclosure are primarily described in the context of wellbore systems, the subject matter described herein is similarly applicable to any tubular system. The tool is inserted into the flowline (tubular **110**) by an opening in a flanged spool **114**. In some implementations, the flanged spool **114** includes a solid trap **116** configured to capture any solids loosened by the tool during operations. While primarily described as a flanged spool, a threaded or welded spool can be used without departing from this disclosure.

FIG. **2** is a cross-sectional diagram of the example corrosion inhibitor system **100** moving a tool **200** within a tubular **110**. While the tubular **110** is illustrated as a horizontal tubular for simplicity, the system **100** can similarly be used with a deviated (slanted) or vertical tubular without departing from this disclosure. The tool **200** itself includes a central tubular **202** defining a central flow passage and spray nozzles along an outer circumference of the central tubular **202**. The central tubular **202** itself can be a rigid pipe or a flexible hose. The central tubular is supported at a first end by first brush pig **204**, and is supported at a second end by a second brush pig **206**.

Within the second brush pig **206** is an inflatable balloon **208**. That is, the inflatable balloon **208** is encircled by the second brush pig **206**. The inflatable balloon **208** is configured to cause a first pressure drop across the balloon when in an inflated state. That is, during operation, the tool **200** can be moved by applying a pressure either uphole or downhole of the inflatable balloon **208** when in the inflated state, and the tool **200** moves in response to the pressure differential. The inflatable balloon **208**, in some instances, is in a deflated state. In such instances, a pressure drop across the tool **200** decreases. That is, the pressure drop across the tool **200** when the inflatable balloon **208** is in a deflated state is less than the pressure drop across the tool **200** when the inflatable balloon is in the inflated state. Such instances can be used, for example, when flowing additional fluids down the wellbore, such as diesel for pickling operations. Alternatively or in addition, such instances are used, for example, to reduce torque on the motor **210** and hose reel **106** when the tool **200** is being retrieved. More details about states of the inflatable balloon **208**, and how the inflatable balloon **208** is actuated between these states, is described throughout this disclosure. In some implementations, a system controller **216** monitors and controls aspects of the system **100**, such as the motor **210** or the pump **104** (FIG. **1**).

A flow control system **212** is at the first end of the central tubular **202**. The flow control system **212** is configured to regulate fluid exchange with the central tubular **202**, the inflatable balloon **208**, and the corrosion inhibitor hose **108**. That is, the flow control system **212** is configured to receive a chemical injection line connected the injection pump **104** (FIG. **1**).

At the second end of the tool **200** (downhole-end depending on operations) is a relief valve **214**. The relief valve **214** is configured to release pressure and fluid from the inflatable balloon **208**. That is, the relief valve **214** is opened to change the inflatable balloon **208** from the inflated state to the deflated state.

FIG. **3** is a cross-sectional diagram of the example corrosion inhibitor system tool **200** within a tubular **110**. The tubular **110** can include a wellbore, a pipeline, or any other tubular. In the illustrated example, liquids **302** have collected at the bottom of the tubular **110**. Referring back to the flow control system **212**, the flow control system **212** includes a directional valve **304** configured to direct fluid flow to the tubular **110**, the inflatable balloon **208**, or both simultaneously.

The flow control system **212** also includes a first check valve **306** between the directional control valve **304** and the tubular **110**. The first check valve **306** is configured to direct fluid flow towards the tubular **110** and away from the directional valve **304**. That is, the first check valve **306** reduces the likelihood or fully prevents fluids from flowing back from the central tubular **202** towards the directional valve **304**. A second check valve **308** is between the directional control valve **304** and the inflatable balloon **208**, the second check valve **308** configured to direct fluid flow towards the inflatable balloon **208** and away from the directional valve **304**. That is, the second check valve **308** reduces the likelihood or fully prevents fluid from flowing back from the inflatable balloon towards the directional valve **304**.

In some implementations, the relief valve **214** is an electronically controlled valve. In some implementations, the relief valve **214** is a hydraulically, pneumatically, or mechanically controlled valve. Regardless of the type of valves used, in some implementations, the relief valve **214** is controlled by the controller **216** at the corrosion inhibitor pump. In some implementations, a controller can be included physically with the tool **200**. Alternatively or in addition, the relief valve can include a frangible component, such as a rupture disk or shear pin, to operate the relief valve **214**.

FIGS. **4**A-**4**D are various views of the central tubular **202** of the tool **200**. As previously discussed, the central tubular **202** can include a rigid tubular or a flexible hose. In implementations where a hose is used, the central tubular **202** is kept in tension during operations to prevent collapse of the central tubular **202**. Tension is maintained through the pressure differential created by the inflatable balloon **208** (FIG. **3**), the hose **108** (FIG. **2**), or a combination of the two. Alternatively or in addition, rigid members can be included in addition to the central tubular **202** without departing from this disclosure. The central tubular itself defines nozzles, or ports, that fluidically connect the flow passage to an outside environment, such as an interior of the tubular **110**. The nozzles **402** are arranged and defined such that the nozzles **402** provide a spray pattern that covers and/or impacts a substantial entirety (within 5%) of an interior surface of the tubular **110**. Fluid is ejected from the nozzles **402** with sufficient force to reduce or eliminate the likelihood that the nozzles **402** become blocked by solid particulates. The central tubular **202** is configured to receive fluid from the pump **104** and direct the fluid evenly along an inner circumference of a tubular **110** in which the tool **200** (FIG. **3**) is inserted.

FIGS. **5**A and **5**B are various views of the first brush pig **204**, at a first end (an uphole or upstream end depending on the operation) of the tool **200**. The first brush pig **204** includes an outer ring **502** defining an inner surface and an outer surface. A brush **504** emits from the outer surface of the outer ring **502**. The brush **504** is configured to evenly spread sprayed corrosion inhibitor along the interior surface of the tubular **110** (FIG. **3**). An inner ring **506** is radially centered (within standard manufacturing tolerances) within the outer ring **502**. The inner ring **506** is configured to support the central tubular **202** (FIG. **4**A-D). A support bar **508** extends between an outer surface of the inner ring **506** and an inner surface of the outer ring **502**. The support bar **508** supports the inner ring **506** to the outer ring **502**. In some implementations, the support bar **508** is attached to the inner ring **506** and the outer ring with fasteners, welding, adhesives, or an interference fit. The support bar **508**, the inner ring **506**, and the outer ring **502** are constructed of materials of sufficient strength to support the central tubular **202** (FIG. **3**).

FIGS. **6**A-**6**D are various views of the second brush pig **206** at the second, downhole end (downstream end depending on operations) of the tool **200**. The second brush pig **206** is substantially similar to the first brush pig **204** with the exception of any differences described herein.

The second brush pig **206** has two support bars **608**. A first support bar **608***a* extends between an outer surface of the inner ring **606** and an inner surface of the outer ring **602**. A second support bar **608***b* extends between the outer surface of the inner ring **606** and an inner surface of the outer ring **602**. The first support bar **608***a* and the second support bar **608***b* axially retain the inflatable balloon **208**. In some implementations, a solid disk **610** is between the inner ring **606** and the outer ring **602**. The solid disk **610** is supported by the outer ring **602** and surrounds the inflatable balloon **208**. In some implementations, the disk **610** is axially retained by the first support bar **608***a* and the second support bar **608***b*.

FIG. **6**C illustrates the inflatable balloon **208** in the inflated state, and FIG. **6**D illustrates the inflatable balloon **208** in the deflated state. As can be seen from the illustrations, the inflatable balloon **208**, when in the inflated state, extends towards the disk **610**. In some implementations, the inflatable balloon **208** seats against the disk **610** when in the inflated state. In the deflated state, the inflatable balloon **208** has a smaller cross sectional area, reducing the pressure drop across the tool **200** when compared to the inflatable balloon **208** being in the inflated state.

FIG. **7** is a flowchart of an example method **700** that can be used with aspects of this disclosure. At **702**, the tool **200** is received by a tubular. At **704**, a corrosion inhibitor is applied to an inner surface of the tubular. In some implementations, applying corrosion inhibitor to an inner surface of the tubular includes spraying the corrosion inhibitor. In some implementations, spraying the corrosion inhibitor can be done by the central tubular **202**. In some implementations, the corrosion inhibitor is spread by the brush (**504**, **604**) along an outer surface of the first brush pig **204**, the second brush pig **206**, or both. Alternatively or in addition, an interior of the tubular is cleaned, scraped, or otherwise conditioned prior to receiving corrosion inhibitor by the brush (**504**, **604**). For example, in instances where the tool **200** is traveling in a direction away from the point of entry into the tubular, the second brush **604** conditions the inner surface of the tubular **110** while the first brush spreads the corrosion inhibitor along an inner surface of the tubular.

During operation, in some instances, the inflatable balloon **208** is inflated with corrosion inhibitor pumped from the pump **104**. The inflated inflatable balloon **208** creates a pressure differential across the tool **200** responsive to inflating the balloon. In some instances, this pressure differential is used to move the tool in a downhole or downstream direction (depending on the use case).

Alternatively or in addition, in some instances, the inflatable balloon **208** is deflated by the relief valve **214** fluidically coupled to the inflatable balloon **208**. The deflation lowers the pressure drop across the tool **200**. As such, in some instances, the tool is moved in an uphole or upstream direction by tension in the chemical supply line (hose **108**) configured to supply corrosion inhibitor to the tool **200** from the pump **104**. The decreased pressure drop reduces the torque on the motor **210** and the reel **106** during retrieval operations. The combination of tension and control of pressure differential allows the tool **200** to have a controllable speed in both a forward (downpipe, downhole) or backward (uphole, up-pipe) direction.

While this disclosure contains many specific implementation details, these should not be construed as limitations on the scope of any inventions or of what may be claimed, but rather as descriptions of features specific to particular implementations of particular inventions. Certain features that are described in this disclosure in the context of separate implementations can also be implemented in combination in a single implementation. Conversely, various features that are described in the context of a single implementation can also be implemented in multiple implementations separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

Similarly, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. Moreover, the separation of various system components in the implementations described above should not be understood as requiring such separation in all implementations, and it should be understood that the described components and systems can generally be integrated together in a single product or packaged into multiple software products.

Thus, particular implementations of the subject matter have been described. Other implementations are within the scope of the following claims. In some cases, the actions recited in the claims can be performed in a different order and still achieve desirable results. In addition, the processes depicted in the accompanying figures do not necessarily require the particular order shown, or sequential order, to achieve desirable results.

What is claimed is:

1. A tool system comprising:

a central tubular defining a central flow passage and spray nozzles along an outer circumference of the central tubular that fluidically connect the flow passage to an outside environment, the tubular configured to receive fluid from a corrosion inhibitor pump and direct the fluid along an inner circumference of a tubular in which the tool is inserted;

a first brush pig supporting a first end of the central tubular, the first brush pig configured to support the first end of the central tubular;

a second brush pig supporting a second end of the central tubular, the second brush pig configured to support the second end of the central tubular;

an inflatable balloon at the second end of the central tubular, the inflatable balloon encircled by the second brush pig, the inflatable balloon configured to cause a first pressure drop in the fluid across the inflatable balloon when in an inflated state, and cause a second pressure drop in the fluid, less than the first pressure drop, across the inflatable balloon when in a deflated state; and

a flow control system at the first end of the central tubular, the flow control system configured to regulate fluid exchange with the central tubular and fluid exchange with the inflatable balloon, the flow control system configured to receive a chemical injection line connected to the corrosion inhibitor pump.

2. The tool system of claim **1**, wherein the first brush pig comprises:

an outer ring defining an inner surface and an outer surface;

a brush emitting from the outer surface of the outer ring;

an inner ring radially centered within the outer ring, the inner ring configured to support the central tubular; and

a support bar extending between an outer surface of the inner ring and an inner surface of the outer ring, the support bar supporting the inner ring to the outer ring.

3. The tool system of claim **1**, wherein the second brush pig comprises:

an outer ring defining an inner surface and an outer surface;

a brush emitting from the outer surface of the outer ring;

an inner ring radially centered within the outer ring, the inner ring configured to support the central tubular and the inflatable balloon;

a first support bar extending between an outer surface of the inner ring and an inner surface of the outer ring, the support bar supporting the inner ring to the outer ring;

a second support bar extending between an outer surface of the inner ring and an inner surface of the outer ring, the support bar supporting the inner ring to the outer ring, the first support bar and the second support bar axially retaining the inflatable balloon; and

a solid disk between the inner ring and the outer ring, the solid disk being supported by the outer ring, the solid disk surrounding the inflatable balloon.

4. The tool system of claim **1**, wherein the flow control system comprises:

a directional valve configured to direct fluid flow to the central tubular or the inflatable balloon;

a first check valve between the directional control valve and the central tubular, the first check valve configured to direct fluid flow towards the central tubular; and

a second check valve between the directional control valve and the inflatable balloon, the second check valve configured to direct fluid flow towards the inflatable balloon.

5. The tool system of claim **4**, wherein the directional valve is an electronically controlled valve.

6. The tool system of claim **5**, wherein the electronically controlled valve is configured to be controlled by a controller at the corrosion inhibitor pump.

7. The tool system of claim **5**, further comprising:

a relief valve at a downhole end of the tool, the relief valve configured to release pressure from the inflatable balloon.

8. A system comprising:

a hose reel;

a hose coupled to the hose reel;

a chemical injection pump arranged to supply corrosion inhibitor through the hose; and

a tool comprising:

a central tubular defining a central flow passage and spray nozzles fluidically connecting the flow passage to an outside environment;

a first brush pig supporting a first end of the central tubular;

a second brush pig supporting a second end of the central tubular;

an inflatable balloon at the second end of the central tubular, the inflatable balloon encircled by the second brush pig; and

a flow control system at the first end of the central tubular, the flow control system configured to regulate fluid exchange with the central tubular and fluid exchange with the inflatable balloon, the flow control system configured to receive a chemical injection line.

9. The system of claim **8**, wherein the first brush pig comprises:

an outer ring defining an inner surface and an outer surface;

a brush emitting from the outer surface of the outer ring;

an inner ring radially centered within the outer ring, the inner ring configured to support the central tubular; and

a support bar extending between an outer surface of the inner ring and an inner surface of the outer ring, the support bar supporting the inner ring to the outer ring.

10. The system of claim **8**, wherein the second brush pig comprises:

an outer ring defining an inner surface and an outer surface;

a brush emitting from the outer surface of the outer ring;

an inner ring radially centered within the outer ring, the inner ring configured to support the inflatable balloon;

a support bar extending between an outer surface of the inner ring and an inner surface of the outer ring, the support bar supporting the inner ring to the outer ring; and

a solid disk between the inner ring and the outer ring, the solid disk being supported by the outer ring.

11. The system of claim **8**, wherein the flow control system comprises:

a directional valve configured to direct fluid flow to the central tubular or the inflatable balloon;

a first check valve between the directional control valve and the central tubular, the first check valve configured to direct fluid flow towards the central tubular; and

a second check valve between the directional control valve and the inflatable balloon, the second check valve configured to direct fluid flow towards the inflatable balloon.

12. The system of claim **11**, wherein the directional valve is an electronically controlled valve.

13. The system of claim **12**, wherein the electronically controlled valve is configured to be controlled by a controller at the chemical injection pump.

14. The system of claim **8**, further comprising:

a relief valve at a downhole end of the tool, the relief valve configured to release pressure from the inflatable balloon.

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